

Multiple-Choice Test – A Primer on Differentiation
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1. The definition of the first derivative of a function $f(x)$ is

- (A) $f'(x) = \frac{f(x + \Delta x) + f(x)}{\Delta x}$
- (B) $f'(x) = \frac{f(x + \Delta x) - f(x)}{\Delta x}$
- (C) $f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) + f(x)}{\Delta x}$
- (D) $f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$

2. Given $y = 5e^{3x} + \sin x$, $\frac{dy}{dx}$ is

- (A) $5e^{3x} + \cos x$
- (B) $15e^{3x} + \cos x$
- (C) $15e^{3x} - \cos x$
- (D) $2.666e^{3x} - \cos x$

3. Given $y = \sin 2x$, $\frac{dy}{dx}$ at $x = 3$ is most nearly

- (A) 0.9600
- (B) 0.9945
- (C) 1.920
- (D) 1.989

4. Given $y = x^3 \ln x$, $\frac{dy}{dx}$ is

- (A) $3x^2 \ln x$
- (B) $3x^2 \ln x + x^2$
- (C) x^2
- (D) $3x$



5. The velocity of a body as a function of time is given as $v(t) = 5e^{-2t} + 4$, where t is in seconds, and v is in m/s. The acceleration in m/s^2 at $t = 0.6$ s is

- (A) -3.012
- (B) 5.506
- (C) 4.147
- (D) -10.00

6. If $x^2 + 2xy = y^2$, then $\frac{dy}{dx}$ is

- (A) $\frac{x+y}{y-x}$
- (B) $2x+2y$
- (C) $\frac{x+1}{y}$
- (D) $-x$

